

What is claimed is:

- 5 1) In a process for the fabrication of carbon foams, carbon fibers, carbon ceramic composites and C/C composites from a petroleum or coal pitch, polyacrylonitrile or rayon and including the steps of forming a carbon precursor, and stabilizing and carbonizing said carbon precursor, the improvement comprising:

10 providing to said carbon precursor, at the atomic level an oxygen spillover catalyst that permits shortening or elimination of said stabilization step.

- 15 2) The method of claim 1 wherein said oxygen spillover catalyst is provided to said carbon precursor by blending of said oxygen spillover catalyst with said petroleum or coal pitch, polyacrylonitrile or rayon starting material prior to formation of said carbon precursor.

- 20 3) The method of claim 1 wherein said oxygen spillover catalyst is provided to said carbon precursor by exposure of said carbon precursor to said oxygen spillover catalyst during stabilization or carbonization.

- 4) The method of claim 2 wherein said oxygen spillover catalyst is blended with said petroleum or coal pitch, polyacrylonitrile or rayon starting material at a concentration of from about 1 to about 50 percent by weight

of said petroleum or coal pitch, polyacrylonitrile or rayon starting material.

5 5) The method of claim 4 wherein said oxygen spillover catalyst is blended with said petroleum or coal pitch, polyacrylonitrile or rayon starting material at a concentration of from about 5 to about 30 percent by weight of said petroleum or coal pitch, polyacrylonitrile or rayon starting material.

10 6) The method of claim 1 wherein said oxygen spillover catalyst is selected from the group consisting of oxides of lanthanum series oxides and transitions metal oxides.

15 7) The method of claim 2 wherein said oxygen spillover catalyst is a lanthanum series or transition metal oxide.

8) The method of claim 3 wherein said oxygen spillover catalyst is a lanthanum series or transition metal oxide.

20 9) The method of claim 4 wherein said oxygen spillover catalyst is selected from the group consisting of lanthanum series oxides and transition metal oxides.

10) The method of claim 9 wherein said oxygen spillover catalyst is selected from the group consisting of cerium oxide, praseodymium oxide, terbium oxide and iron oxide.

5 11) The method of claim 3 wherein said exposure of said carbon precursor to said oxygen spillover catalyst during stabilization or carbonization is accomplished by spraying said carbon precursor with said oxygen spillover catalyst prior to stabilization or carbonization.

10 12) A carbon foam, carbon fiber, carbon ceramic composite or C/C composite fabricated from a petroleum or coal pitch, polyacrylonitrile or rayon by a process comprising:

A) forming a carbon precursor; and

15 B) stabilizing and carbonizing said carbon precursor and further including:

providing to said carbon precursor, at the atomic level an oxygen spillover catalyst that permits shortening or elimination of said stabilization step.

20 13) The carbon foam, carbon fiber, carbon ceramic composite or C/C composite of claim 12 wherein said oxygen spillover catalyst is provided to said carbon precursor by blending of said oxygen spillover catalyst

with said petroleum or coal pitch, polyacrylonitrile or rayon starting material prior to formation of said carbon precursor.

5 14) The carbon foam, carbon fiber, carbon ceramic composite or C/C composite of claim 12 wherein said oxygen spillover catalyst is provided to said carbon precursor by exposure of said carbon precursor to said oxygen spillover catalyst during stabilization or carbonization.

10 15) The carbon foam, carbon fiber, carbon ceramic composite or C/C composite of claim 13 wherein said oxygen spillover catalyst is blended with said petroleum or coal pitch, polyacrylonitrile or rayon starting material at a concentration of from about 1 to about 50 percent by weight of said petroleum or coal pitch, polyacrylonitrile or rayon starting material.

15 16) The carbon foam, carbon fiber, carbon ceramic composite or C/C composite of claim 15 wherein said oxygen spillover catalyst is blended with said petroleum or coal pitch, polyacrylonitrile or rayon starting material at a concentration of from about 5 to about 30 percent by weight
20 of said petroleum or coal pitch, polyacrylonitrile or rayon starting material.

17) The carbon foam, carbon fiber, carbon ceramic composite or C/C composite of claim 12 wherein said oxygen spillover catalyst is selected from the group consisting of oxides of lanthanum series oxides and transitions metal oxides.

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18) The carbon foam, carbon fiber, carbon ceramic composite or C/C composite of claim 13 wherein said oxygen spillover catalyst is a lanthanum series or transition metal oxide.

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19) The carbon foam, carbon fiber, carbon ceramic composite or C/C composite of claim 14 wherein said oxygen spillover catalyst is a lanthanum series or transition metal oxide.

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20) The carbon foam, carbon fiber, carbon ceramic composite or C/C composite of claim 15 wherein said oxygen spillover catalyst is selected from the group consisting of lanthanum series oxides and transition metal oxides.

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21) The carbon foam, carbon fiber, carbon ceramic composite or C/C composite of claim 20 wherein said oxygen spillover catalyst is selected from the group consisting of cerium oxide, praseodymium oxide, terbium oxide and iron oxide.

22) The carbon foam, carbon fiber, carbon ceramic composite or C/C composite of claim 14 wherein said exposure of said carbon precursor to said oxygen spillover catalyst during stabilization or carbonization is accomplished by spraying said carbon precursor with said oxygen spillover catalyst prior to stabilization or carbonization.

23) A carbon material selected from the group consisting of carbon foams, carbon fibers, carbon metal composites and carbon/carbon composites containing lanthanum series or transition metal oxides.